

FLIGHTS OF THE WESTERN THATCHING ANT,  
*FORMICA OBSCURIPES* FOREL, IN NEVADA  
(HYMENOPTERA: FORMICIDAE)<sup>1</sup>

William H. Clark<sup>2</sup> and Peter L. Comanor<sup>2</sup>

ABSTRACT.— Observations indicate that *Formica obscuripes* flies earlier in Nevada than in other parts of the country where the flights have been recorded. The alate males are the first to emerge from the nest. These are eventually succeeded by alate females, and finally only females are seen. *F. obscuripes* flew during periods when air temperatures were 20.5-26.5 C, when relative humidities were about 18%, and when solar input was about 1.35 langleys. Slight winds approaching 3 mph did not keep the ants from flying but may have influenced their direction of flight.

The nests of *F. obscuripes* observed near Reno differ from those reported in other areas in that they do not have such an extensive thatch covering them.

Flight activities have been reported for *Formica obscuripes* by McCook (1884). He states that the marriage flight of this ant in "Dakota" occurs in "the latter part of July, [when] numerous swarms of 'flying ants' are seen" and that "the appearance of the swarms continuing throughout August and into September" has been observed. Cole (1932) states that "winged males and females appear in large numbers during June and July." In North Dakota, flights occur in the month of June (Weber, 1935), and in Michigan, in June and early July (Talbot, 1959; 1972). It has been suggested that *F. obscuripes* does not have true nuptial flights and that winged forms leave the nest one or a few at a time (Weber, 1935). On the other hand, more recent observation suggests that *F. obscuripes* has conspicuous swarming and mating activities (Talbot, 1959; 1972). This seems to be substantiated by the polygynous habit of this ant (King and Sallee, 1956). Wheeler and Wheeler (1963) report winged females of *F. obscuripes* in nests from 6 June to 8 August and winged males from 23 May to 12 July in North Dakota.

Records of flight activities of this ant in the Great Basin have not been found in the literature. The Nevada flights reported below were first noted on 15 April and lasted until at least 10 May 1972, thus occurring almost two months earlier than previously recorded for this species.

*F. obscuripes* has been recorded in Nevada, but not previously in Washoe County (La Rivers, 1968).

#### MATERIALS AND METHODS

Three nests of *F. obscuripes* were periodically observed from 15 April to 10 May 1972 in conjunction with other ant studies in the general areas of the study sites described below.

<sup>1</sup>This work was assisted by a grant from the Research Advisory Board, University of Nevada, Reno.

<sup>2</sup>Department of Biology, University of Nevada, Reno, Nevada 89507

Numbers of winged males and females on the nests, in nearby vegetation, and actually flying were noted. Temperature data were taken in C by two methods. At nest number 1, the temperatures were taken with a YSI 12 channel telethermometer, and temperatures at nests number 2 and 3 were taken with two standard laboratory glass thermometers. Ground surface temperatures and air temperatures at 10 cm above the ground surface were taken. Relative humidity was taken with a sling psychrometer operated as near the ground surface as possible, and wind measurements were made with a hand-held anemometer at 1 meter above ground surface. On 1 May, solar input, in langley's per minute ( $\text{cal}/\text{cm}^2/\text{min}$ ), was taken with a weathermeasure recording pyranograph.

The three *F. obscuripes* nests observed during April and May 1972, all located just north of Reno, Washoe County, Nevada, occur at elevations of about 1550 m and are separated by distances of up to 15 miles. The vegetation of these areas is dominated by *Artemesia tridentata*, basin big sagebrush. Numbers of subordinate species vary among the sites. The chief ones are *Chrysothamnus viscidiflorus*, *C. nauseosus*, *Ephedra viridis*, *Ribes velutinum*, *Tetradymia canescens* and *Bromus tectorum*. Nest number 1 is 1.1 m in diameter and 30 cm high. It is constructed around a living *Chrysothamnus nauseosus* shrub, and its thatch is relatively thin and composed mainly of *Ephedra viridis* stems, *Artemesia tridentata* bark, and grass overlying a base of coarse, decomposed granite sand. Nest number 2 is 79 cm in diameter and 25 cm high. This nest is built around living and dead *Artemesia tridentata* and *Tetradymia canescens*, with its thatch constructed mainly of sage bark and grass. Nest number 3 is 50 cm in diameter and 15 cm tall and is in living and dead *Artemesia tridentata* and *Chrysothamnus viscidiflorus*. Its thatch is composed mostly of *Ephedra viridis* stems, sage bark, and grass.

These three nests differ from the nests described by Cole (1932), Weber (1935), and Wheeler and Wheeler (1963) in the extent of the thatching. These workers state that the thatch material covers the mound and extends into the soil to varying depths, to a maximum of about 30 cm. The three nests observed in this study have a thin layer of thatch on top, with the lower sides composed mostly of bare gravel and occasional sticks or grass stems. None of the nests observed has a thatch that extends to or into the ground.

## RESULTS

The first winged individuals of *F. obscuripes* observed were males noted on the morning of 15 April. About a dozen winged males were observed in *Chrysothamnus nauseosus* near nest number 1. After these winged ants were noticed, two other *F. obscuripes* nests were located and occasionally observed. On 18 April, seven males were collected from the surface of nest number 2 in the time period from 10:00 to 10:30 a.m. None were observed in surrounding plants. Nest number 3 was located on 19 April, but no winged individuals were found; however, two winged males were seen on nest number

2. On 29 April at 2:45 p.m., winged males were again observed on nest number 2.

On 1 May 1972, nest number 1 was observed for a day (see Table 1), and a maximum of fourteen females flew per minute at 10:25 a.m., representing the height of the flight, when the air temperature at 10 cm above ground surface was 25 C (see Figure 1).

#### DISCUSSION

According to Weber (1935), when "the air is calm, the sky quite clear, the temperature above 60 F (15 C), and the humidity above 50%, the ants take flight." These temperatures were taken at 10 inches (25.4 cm) above ground level (Talbot, 1971). Talbot (1959) found that *F. obscuripes* "began flying at about 70 F (21 C), provided they were not wet, the grass was not swaying, and the sky was not darkening." The correspondence of flights with rising temperatures in the morning is supported by work on several species of *Formica* elsewhere (Talbot, 1964). The flights observed in Nevada all occurred within the temperature range given by Talbot (1959; 1972).

During the flights recorded for Nevada, a breeze was always present, the sky was clear, and the temperature was always above



Fig. 1. Alate *Formica obscuripes* females on *Chrysothamnus nauscosus* 1 May 1972.

TABLE 1. Flight activities of *Formica obscuripes* at nest number 1 on 1 May 1972.

Time <sup>1</sup>	Air Temp. <sup>2</sup> (C)	Ground Surface Temp. (C)	% Relative Humidity	Wind (mph)	Solar Input (g-cal/cm <sup>2</sup> /min)	No. alate ants on surface ♂	No. alate ants on surface ♀	No. alate ants on plants ♂	No. alate ants on plants ♀	Flights/minute alate females
8:30 a.m.	18.5	24.5	44	0	0.90	0	4	0	0	0
8:40	18.5	26	—	..	0.98	3	25	1	8	0
9:00	20	29.5	24	0	1.045	3	78	2	27	0
10:00	23	38.5	18	2.3	1.27	5	58	2	100	0
10:20	25	41	—	..	1.33	2	27	2	120	3
10:25	25	41	—	..	1.35	0	19	1	113	14
11:00	26.5	45.5	18	2.9	1.435	0	5	1	45	6
11:45	28	50	—	..	1.50	0	0	1	0	0
12:00	28.5	52	16	0.8	1.52	0	0	1	0	0
1:00-5:00 p.m.	32-22.5	55-39	17-18	0-3.2	1.54-1.01	0	0	0	0	0
5:20	22	30	—	..	0.90	0	3	0	0	0

<sup>1</sup>Pacific Daylight Saving Time<sup>2</sup>10 cm above ground surface

15 C. The humidity during these flights was always below 50%, with a relative humidity of about 18% during flights which occurred on 1 May 1972. The wind was not strong, usually averaging 2-3 mph, and did not seem to inhibit the flight of the ants. As they were observed to fly from the *Chrysothamnus* stems which were moving in the wind, the wind did seem to influence the direction of flight. On 1 May, the wind was from the east and the ants were flying westward and northwestward. The alate ants flew upward for one to about five meters, occasionally straight up, but usually at an angle to the west. Several times females would begin flight in an easterly or southerly direction and after attaining an altitude of several meters would shift to a westerly direction. This change in flight direction could be a result of the light winds present. The same type of wind conditions prevailed on 4 May, and again the ants flew in a westerly direction. Three winged females appeared on the nest surface for a short time at 5:20 p.m., then returned into the nest. Winged ants were seen outside the nest when the corresponding solar input ranged from 0.98 to 1.52 langleys and were observed to fly when the solar input ranged from 1.33 to 1.435 langleys.

On 4 May at 10:00 a.m., nest number 1 had 10 females on the surface and 45 were located in nearby shrubs; three males were observed in shrubs. Sixteen females and one male flew in a one-minute time period, when the air temperature was 20.5 C. At 10:30 a.m. nest number 3 had one winged female on the nest surface. On 10 May at 8:45 a.m., nest number 2 had seven winged females on the surface and one in a sagebrush. At 9:45 a.m., nest number 3 had 10 winged females on the nest and 20 in sagebrush.

An additional *F. obscuripes* nest on Austin Summit, Lander County, Nevada, elevation 2286 m, was found to have no winged individuals present outside the nest during the morning of 12 May 1972.

Winged males of *F. obscuripes* were much fewer than females. Males were also the first winged forms observed to leave the nest in April; gradually more females were present, until finally in May only females were flying. These observations agree with those of Talbot (1959) for this species.

Our observations indicate that *F. obscuripes* flies earlier in Nevada than elsewhere where it has been observed. Sudd (1967) states that "ants of deserts and steppes do not fly in late summer, when the queens would be exposed to hot, dry weather in the time when they are founding colonies. The flight is delayed till spring." The earlier flights in Nevada could be an avoidance of the summertime hot, dry weather; or, it may be that the ants simply develop sooner in this climate.

#### ACKNOWLEDGEMENTS

The authors thank Drs. George C. and Jeanette Wheeler for the species determination of *F. obscuripes*.

## LITERATURE CITED

- COLE, A. C., JR. 1932. The thatching ant, *Formica obscuripes* Forel. *Psyche* 39:30-33.
- KING, R. L., AND R. M. SALLEE. 1956. On the half-life of nests of *Formica obscuripes* Forel. *Proc. Iowa Acad. Sci.* 63:721-723.
- LA RIVERS, I. 1968. A first listing of the ants of Nevada (Hymenoptera, Formicidae). *Occ. Pap. Biol. Soc. Nevada* 17:1-12.
- MCCOOK, H. C. 1884. The rufous of thatching ant of Dakota and Colorado. *Proc. Acad. Natur. Sci. Phila.* Part 1, pp. 57-65.
- SUDD, J. H. 1967. An introduction to the behavior of ants. Arnold, London. 200 p.
- TALBOT, M. 1959. Flight activities of two species of ants of the genus *Formica*. *Amer. Midl. Natur.* 61:124-132.
- . 1964. Nest structure and flights of the ant *Formica obscuriventris* Mayr. *Animal Behaviour* 12:154-158.
- . 1971. Flights of the ant *Formica dakotensis* Emery. *Psyche* 78:169-179.
- . 1972. Flights and swarms of the ant *Formica obscuripes* Forel. *Jour. Kansas Entomol. Soc.* 45:254-258.
- WEBER, N. A. 1935. The biology of the thatching ant *Formica obscuripes* Forel in North Dakota. *Ecol. Monogr.* 5:165-206.
- WHEELER, G. C., AND J. WHEELER. 1963. The ants of North Dakota. Univ. North Dakota Press, Grand Forks. 326 p.